AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

Claim 1 (previously presented): An OFDM packet communication receiver comprising:

a receiving means (102) for receiving OFDM signals and carrying out a predetermined process to said OFDM signals,

a synchronization means (103) for timing synchronization and carrier frequency synchronization for the received OFDM signals provided by said receiving means (102),

a Fourier transform means (105) for carrying out Fourier transform of said received OFDM signals provided by said synchronization means to divide them into subcarrier signals for each OFDM symbol,

a channel estimation means (106) for estimating channel condition of each subcarrier by using the subcarrier signals divided by said Fourier transform means,

a coherent detection means (107) for carrying out coherent detection of the subcarrier signals divided by said Fourier transform means by using the channel estimation result provided by said channel estimation means,

wherein a clock frequency error estimation means (100) for detecting phase rotation or accumulated phase rotation of a part or all of the coherently detected signals provided by the coherent detection means caused by clock frequency error between a transmitter and a receiver by

detecting phase difference between the coherently detected signal (R1, R2) and a reference signal (S1 through S16), and generating phase rotation information ($\Delta\theta$) of each subcarrier signal caused by said clock frequency error (f_{RCLK} - f_{TCLK}),

a phase rotation compensation means (109) for compensating the phase rotation of the coherently detected signals provided by said coherent detection means caused by clock frequency error according to said phase rotation information generated by said clock frequency error estimation means, and

a decision means (112) for decision processing for the phase compensated coherently detected signals provided by said phase rotation compensation means.

Claim 2 (previously presented): An OFDM packet communication receive system according to claim 1, wherein said clock frequency error estimate means comprises:

weighting means for weighting said phase rotation from a phase of a related reference signal in an output of said coherent detection means according to signal quality of each sub-carrier obtained in said channel estimating means, and

smoothing means for smoothing weighted phase rotation along time axis, so that weighted and smoothed phase rotation is used for measuring phase rotation or accumulated phase rotation caused by clock frequency error.

Claim 3 (original): An OFDM packet communication receiver of claim 1, wherein

said clock frequency error estimation means estimates phase rotation or accumulated phase rotation of pilot signals included in the coherently detected signals provided by said coherent detection means caused by clock frequency error.

Claim 4 (previously presented): An OFDM packet communication receive system according to claim 1, wherein said clock frequency error estimate means comprises:

weighting means for weighting phase rotation of a pilot signal from a reference signal point, included in an output of said coherent detection means, and

smoothing means for smoothing weighted phase rotation along a time axis, so that weighted and smoothed phase rotation is used for detecting phase rotation or accumulated phase rotation caused by clock frequency error.

Claim 5 (previously presented): An OFDM packet communication receive system comprising:

a receiving means for receiving OFDM signals and carrying out a predetermined process to said OFDM signals,

a synchronization means for timing synchronization and carrier frequency synchronization for the received OFDM signals provided by said receiving means,

a Fourier transform means for carrying out Fourier transform of said received OFDM signals provided by said synchronization means to divide them into subcarrier signals for each OFDM symbol,

a channel estimation means for estimating channel condition of each subcarrier by using the subcarrier signals divided by said Fourier transform means,

a coherent detection means for carrying out coherent detection of the subcarrier signals divided by said Fourier transform means by using the channel estimation result provided by said channel estimation means,

a phase rotation compensation means for compensating phase rotation of the coherently detected signals provided by said coherent detection means caused by clock frequency error,

a clock frequency error estimation means for detecting phase rotation of a part or all of the phase compensated coherently detected signals provided by the phase rotation compensation means caused by clock frequency error, generating phase rotation information of each subcarrier signal caused by said clock frequency error, and applying generated phase rotation information to said phase rotation compensation means.

Claim 6 (previously presented): An OFDM packet communication receive system according to claim 5, wherein said clock frequency error estimation means comprises:

weighting means for weighting phase rotation of a part or all of detected signal from a reference signal point in an output of said coherent detection means according to signal quality of each sub-carrier obtained in said channel estimate means, and

smoothing means for smoothing weighted phase rotation along a time axis, so that weighted and smoothed phase rotation is used to detect phase rotation caused by clock frequency error.

Claim 7 (previously presented): An OFDM packet communication receive system according to claim 5, wherein said clock frequency error estimation means estimates phase rotation of pilot signals included in the phase compensated coherently detected signals provided by said phase rotation compensation means caused by clock frequency error.

Claim 8 (previously presented): An OFDM packet communication receive system according to claim 5, wherein said clock frequency error estimation means comprises:

weighting means for weighting phase rotation of a pilot signal from a reference signal point, included in an output of said coherent detection means, and

smoothing means for smoothing weighted phase rotation along a time axis, so that weighted and smoothed phase rotation is used for detecting said phase rotation caused by clock frequency error.

Claim 9 (previously presented): An OFDM packet communication receiver comprising:

a receiving means for receiving OFDM signals and carrying out a predetermined process to said OFDM signals,

a synchronization means for timing synchronization and carrier frequency synchronization for the received OFDM signals provided by said receiving means,

a Fourier transform means for carrying out Fourier transform of said received OFDM signals provided by said synchronization means to divide them into subcarrier signals for each OFDM symbol,

a channel estimation means for estimating channel condition of each subcarrier by using the subcarrier signals divided by said Fourier transform means,

a coherent detection means for carrying out coherent detection of the subcarrier signals divided by said Fourier transform means by using the channel estimation result provided by said channel estimation means,

a residual carrier frequency error estimation means for estimating phase rotation of a part or all of an output of said coherent detection means caused by residual carrier frequency error,

a phase rotation estimation means for estimating phase rotation of the coherently detected signal provided by said coherent detection means caused by clock frequency error according to carrier frequency error information supplied by said synchronization means and residual carrier frequency error information supplied by said residual carrier frequency error estimation means, and

a phase rotation compensation means for compensating phase rotation of coherently detected signal provided by said coherent detection means caused by clock frequency error according to phase rotation information supplied by said phase rotation estimation means.

Claim 10 (previously presented): An OFDM packet communication receive system according to claim 9, further comprising:

weighting means for weighting said phase rotation from a reference phase point of a detected signal in an output of said coherent detection means according to signal quality of each sub-carrier obtained in said channel estimation means, and

smoothing means for smoothing the weighted phase rotation along a time axis, so that the weighted and smoothed phase rotation is applied to said residual carrier frequency error estimation means.

Claim 11 (original): An OFDM packet communication receiver according to claim 9, wherein said residual carrier frequency error estimation means detects phase rotation of a coherently detected signal caused by residual carrier frequency error according to phase rotation of a pilot signal provided by said coherent detection means.

Claim 12 (previously presented): An OFDM packet communication receive system according to claim 9, further comprising:

weighting means for weighting phase rotation of a pilot signal from a reference signal point, included in an output of said coherent detection means, and

smoothing means for smoothing weighted phase rotation along a time axis, so that the weighted and smoothed phase rotation is applied to said residual carrier frequency error estimation means.

Claim 13 (previously presented): An OFDM packet communication receiver comprising:

a receiving means for receiving OFDM signals and carrying out a predetermined process to said OFDM signals,

a synchronization means for timing synchronization and carrier frequency synchronization for the received OFDM signals provided by said receiving means,

a Fourier transform means for carrying out Fourier transform of said received OFDM signals provided by said synchronization means to divide them into subcarrier signals for each OFDM symbol,

a channel estimation means for estimating channel condition of each subcarrier by using the subcarrier signals divided by said Fourier transform means,

a coherent detection means for carrying out coherent detection of the subcarrier signals divided by said Fourier transform means by using the channel estimation result provided by said channel estimation means,

a first phase rotation estimation means for estimating phase rotation of each subcarrier signal caused by clock frequency error according to carrier frequency error information supplied by said synchronization means,

a first phase rotation compensation means for compensating phase rotation of coherently detected signals provided by said coherent detection means caused by clock frequency error according to phase rotation information provided by said first phase rotation estimation means,

a residual carrier frequency error estimation means for estimating phase rotation of a part or all of phase compensated signals provided by said first phase rotation compensation means caused by residual carrier frequency error,

a second phase rotation estimation means for estimating residual phase rotation caused by clock frequency error of the phase compensated signal provided by said first phase rotation compensation means according to the residual carrier frequency error information supplied by said residual carrier frequency error estimation means, and

a second phase rotation compensation means for compensating residual phase rotation of the phase compensated signal provided by said first phase rotation compensation means caused by clock frequency error according to the residual phase rotation information supplied by said second phase rotation estimation means.

Claim 14 (previously presented): An OFDM packet communication receive system according to claim 13, further comprising:

weighting means for weighting phase rotation from a reference signal point of an output of said first phase rotation compensation means according to signal quality of each sub-carrier obtained in said channel estimate means, and

smoothing means for smoothing weighted phase rotation along a time axis, so that weighted and smoothed phase rotation is applied to said residual carrier frequency error estimation means.

Claim 15 (original): An OFDM packet communication receiver according to claim 13, wherein said residual carrier frequency error estimation means estimates phase rotation of pilot signals included in the phase compensated signals provided by said first phase compensation means caused by residual carrier frequency error.

Claim 16 (previously presented): An OFDM packet communication receive system according to claim 13, further comprising:

weighting means for weighting phase rotation from a reference point of a pilot signal in an output of said first phase rotation compensation means according to signal quality of each sub-carrier obtained in said channel estimate means, and

smoothing means for smoothing weighted phase rotation along a time axis, so that weighted and smoothed phase rotation is applied to said residual carrier frequency error estimation means.

Claim 17 (currently amended): An OFDM packet communication receiver according to claim 9 ~~or 13~~, wherein said residual carrier frequency error estimation means comprises a phase rotation information extraction means for extracting phase rotation information from a part or all of the input signals of said residual carrier frequency error estimation means, and a common phase rotation detection means which detects phase rotation common to all the subcarrier signals caused by residual carrier frequency error according to phase rotation information extracted by said phase rotation information extraction means.

Claim 18 (previously presented): An OFDM packet communication receiver comprising:

a receiving means for receiving OFDM signals and carrying out a predetermined process to said OFDM signals,

a synchronization means for timing synchronization and carrier frequency synchronization for the received OFDM signals provided by said receiving means,

a Fourier transform means for carrying out Fourier transform of said received OFDM signals provided by said synchronization means to divide them into subcarrier signals for each OFDM symbol,

a channel estimation means for estimating channel condition of each subcarrier by using the subcarrier signals divided by said Fourier transform means,

a coherent detection means for carrying out coherent detection of the subcarrier signals divided by said Fourier transform means by using the channel estimation result provided by said channel estimation means,

a phase rotation information extraction means for extracting phase rotation information from a part or all of the output signals of said coherent detection means,

a signal quality extraction means for extracting signal quality information of a part or all of the subcarrier signals divided by said Fourier transform circuit,

a smoothing means for smoothing said signal quality information of each subcarrier provided by said signal quality extraction means along a time axis,

a weighting means for weighting said phase rotation information provided by said phase rotation information extraction means according to smoothed signal quality information provided by said smoothing means,

a common phase rotation detection means for detecting phase rotation of the coherently detected signals provided by said coherent detection means caused by residual carrier frequency error according to said weighted phase rotation information, and

a phase rotation compensation means for compensating phase rotation of the coherently detected signals provided by said coherent detection means according to the estimated phase rotation information provided by said common phase rotation ~~estimation~~ detection means.

Claim 19 (previously presented): An OFDM packet communication receiver according to claim 18, wherein said common phase rotation detection means comprises an intra-symbol averaging means for averaging phase rotation information inputted to said common phase rotation detection means in one OFDM symbol, and a moving average means for carrying out moving average of a signal averaged by said intra-symbol averaging means in one OFDM symbol along said time axis.

Claim 20 (original): An OFDM packet communication receiver according to claim 17 or 18, wherein said phase rotation information extraction means comprises a pilot signal extraction means for extracting pilot signals from the coherently detected signals inputted to said phase rotation information extraction means, a reference signal generating means for generating

reference signals corresponding to the pilot signals, and a phase rotation detection means for detecting phase rotation of the extracted pilot signals according to the reference signals.

Claim 21 (previously presented): An OFDM packet communication receiver according to claim 17 or 18, wherein said phase rotation information extraction means comprises a specific symbol signal extraction means for extracting coherently detected signals in predetermined specific OFDM symbols inputted to said phase rotation information extraction means, a reference signal generating means for generating reference signals corresponding to said coherently detected signals provided by said specific symbol signal extraction means, and a phase rotation detection means for detecting phase rotation of said coherently detected signals provided by said specific symbol signal extraction means according to said reference signals provided by said reference signal generating means.

Claim 22 (original): An OFDM packet communication receiver according to claim 21, wherein said reference signal generating means comprises a hard decision means for carrying out hard decision to the detected signals in the specific OFDM symbols provided by said specific symbol signal extraction means.

Claim 23 (currently amended): An OFDM packet communication receiver according to claim 20 ~~and 21~~, wherein said phase rotation detection means comprises a reverse modulation means for detecting phase rotation by reverse modulation.

Claim 24 (currently amended): An OFDM packet communication receiver according to claims 20 ~~and 21~~, wherein said phase rotation detection means comprises a sign control means for detecting phase rotation by utilizing sign reverse control according to the reference signals provided by said reference signal generating means.

Claim 25 (previously presented): An OFDM packet communication receiver according to claim 17, further comprising:

a weight coefficient calculation means for calculating weight coefficient for each subcarrier signal corresponding to the signal quality information obtained by the result of channel estimation,

a weighting means for weighting phase rotation information provided by said phase rotation information extraction means according to said weight coefficient of each subcarrier signal provided by said weight coefficient calculation means,

and said common phase rotation detection means detects phase rotation common to each subcarrier signal caused by residual carrier frequency error according to phase rotation information supplied by said weighting circuit.

Claim 26 (previously presented): An OFDM packet communication receiver comprising:

a receiving means for receiving OFDM signals and carrying out a predetermined process to said OFDM signals,

a synchronization means for timing synchronization and carrier frequency synchronization for the received OFDM signals provided by said receiving means,

a Fourier transform means for carrying out Fourier transform of said received OFDM signals provided by said synchronization means to divide them into subcarrier signals for each OFDM symbol,

a channel estimation means for estimating channel condition of each subcarrier by using the subcarrier signals divided by said Fourier transform means,

a coherent detection means for carrying out coherent detection of the subcarrier signals divided by said Fourier transform means by using the channel estimation result provided by said channel estimation means,

specific symbol signal extraction means for extracting coherently detected signals in at least one specific OFDM symbol provided by said coherent detection means,

a hard decision means for carrying out hard decision to the coherently detected signals extracted by said specific symbol signal extraction means,

a first phase rotation detection means for detecting phase rotation of said extracted signals provided by said specific symbol signal extraction means according to the hard decision result provided by said hard decision means,

a weight coefficient calculation means for calculating weight coefficient of each subcarrier signal corresponding to the signal quality according to the result of channel estimation provided by said channel estimation means,

a weighting means for weighting phase rotation information detected by said first phase rotation detection means according to said weight coefficient of each subcarrier signal,

a first common phase rotation detection means for detecting phase rotation common to each subcarrier signal caused by residual carrier frequency error according to said weighted phase rotation information provided by said weighting means,

a pilot signal extraction means for extracting pilot signals from the coherently detected signals provided by said coherently detection means,

a reference signal generating means for generating reference signals corresponding to the pilot signals extracted by said pilot signal extraction means,

a second phase rotation detection means for detecting phase rotation of the pilot signals provided by said pilot signal extraction means,

a second common phase rotation detection means for detecting phase rotation common to each subcarrier signal caused by residual carrier frequency error according to the phase rotation information provided by said second phase rotation detection means,

a selection means for selecting one of the outputs of said first common phase rotation detection means and said second common phase rotation detection means according to the number of OFDM symbols provided by said coherent detection means,

a phase rotation estimation means for estimating phase rotation caused by residual carrier frequency error of the coherently detected signals provided by said coherent detection means according to the selected phase rotation information provided by said selection means,

a phase rotation compensation means for compensating phase rotation of the coherently detected signals provided by said coherent detection means according to the phase rotation information provided by said phase rotation estimation means.

Claim 27 (previously presented): An OFDM packet communication receiver according to claim 26, wherein a

clock frequency is synchronized with carrier frequency in both a transmitter and a receiver,

phase rotation estimation means is provided for estimating phase rotation of the coherently detected signals provided by said coherent detection means caused by clock frequency error according to the carrier frequency error information provided by said synchronization means and phase rotation information caused by residual carrier frequency error provided by said selection means, and

said phase rotation compensation means compensates phase rotation of the coherently detected signals provided by said coherent detection means according to the phase rotation information provided by said phase rotation estimation means.

Claim 28 (previously presented): An OFDM packet communication receiver according to claim 25, 26, or 27, wherein

a signal quality extraction means is provided for extracting signal quality information of a part or all of subcarrier signals divided by said Fourier transform means,

a signal quality smoothing means is provided for smoothing the signal quality information provided by said signal quality extraction means for each subcarrier along time axis,

said weighting means weights the phase rotation information according to smoothed signal quality information of the coherently detected signals provided by said signal quality smoothing means.

Claim 29 (currently amended): An OFDM packet communication receiver according to claim 18 ~~or 28~~, wherein

said signal quality smoothing means carries out moving average process to signal quality information of coherently detected signals provided by said signal quality extraction means along time axis for each subcarrier.

Claim 30 (currently amended): An OFDM packet communication receive system according to claim 18 ~~or 28~~, wherein

said signal quality smoothing means integrates the signal quality information of the coherently detected signals provided by said signal quality extraction means along the time axis to arrive at an integrated value, and divides said integrated value by the number of signals thus integrated.

Claim 31 (currently amended): An OFDM packet communication receive system according to claim 18 ~~or 28~~, wherein

said signal quality smoothing means integrates the signal quality information of the coherently detected signals provided by said signal quality extraction means along the time axis to arrive at an integrated value, and divides said integrated value by bit shifting of N bits when the number of signals thus integrated can be expressed by 2 (N is a natural integer).

Claim 32 (previously presented): An OFDM packet communication receive system according to claim 25 ~~or 28~~, wherein

a clock frequency error mitigation means is provided for reducing phase rotation of the phase rotation information provided by said phase rotation information extraction means caused by clock frequency error according to of the phase rotation information provided by said phase rotation estimation means, and

said weighting means weights the phase rotation information provided by said clock frequency error mitigation means.

Claim 33 (currently amended): An OFDM packet communication receiver according to claim 17 ~~or 20~~, wherein said common phase rotation detection means comprises:

an intra-symbol averaging means for carrying out averaging process to the phase rotation information within one OFDM symbol provided by the phase rotation detection means,

a phase rotation accumulation means for calculating accumulated phase rotation from that time on the channel estimation according to the averaged phase rotation information provided by said intra-symbol averaging means,

a moving average means for carrying out moving average process along time axis to the accumulated phase rotation information provided by said phase rotation accumulation means, and

a division means for dividing moving averaged accumulated phase rotation provided by said moving average means by a difference between the number of OFDM symbols used for the accumulation and the number of delayed OFDM symbols caused by moving average process so that phase rotation caused by residual carrier frequency error for one OFDM symbol is obtained.

Claim 34 (currently amended): An OFDM packet communication receiver according to claim 26 ~~or 27~~, wherein said second common phase rotation detection means comprises:

an intra-symbol averaging means for carrying out averaging process within one OFDM symbol to the phase rotation information provided by said second phase rotation detection means,

a phase rotation accumulation means for calculating accumulated phase rotation from that time on the channel estimation according to the phase rotation information provided by said intra-symbol averaging means,

a time-oriented moving average means for carrying out moving average process along time axis to the accumulated phase rotation information provided by said phase rotation accumulation means, and

a division means for dividing moving averaged accumulated phase rotation provided by said time-oriented moving average means by a difference between the number of OFDM symbols

used for the accumulation and the number of delayed OFDM symbols caused by the moving average process so that phase rotation caused by residual carrier frequency error for one OFDM symbol is obtained.

Claim 35 (previously presented): An OFDM packet communication receiver according to claim 33 or 34, wherein said phase rotation accumulation means comprises:

a delay means for delaying the averaged phase rotation information within one OFDM symbol by one OFDM symbol period,

a phase difference calculation means for calculating difference between the averaged phase rotation information provided by said intra-symbol averaging means and the delayed phase rotation information provided by said delay means so that phase rotation for each OFDM symbol is obtained, and

an integration means for integrating the phase rotation information provided by said phase difference calculation means.

Claim 36 (previously presented): An OFDM packet communication receiver according to claim 17, wherein said common phase rotation detection means comprises:

an intra-symbol averaging means for averaging phase rotation information applied to said common phase rotation detection means within one OFDM symbol,

a delay means for delaying the averaged phase rotation information provided by said intra-symbol averaging means by one OFDM symbol period,

a phase difference calculation means for calculating the difference between the averaged phase rotation information provided by said intra-symbol averaging means and the delayed phase rotation information provided by said delay means so that phase rotation for each OFDM symbol is obtained, and

a time-oriented moving average means for carrying out moving average process along the time axis to the phase rotation information provided by said phase difference calculation means.

Claim 37 (currently amended): An OFDM packet communication receiver according to claim 33 ~~or 34~~, wherein

said division means comprises a bit shift means for carrying out the division process by bit shift operation of N bits when a divisor can be expressed by 2 (N is a natural integer).

Claim 38 (previously presented): An OFDM packet communication receiver according to claim 18, wherein said common phase rotation detection means comprises:

a phase rotation accumulation means for calculating accumulated phase rotation from that time on the channel estimation according to the phase rotation information provided by said weighting means,

an intra-symbol averaging means for averaging the accumulated phase rotation information provided by said phase rotation accumulation means within one OFDM symbol period,

a time-oriented moving average means for carrying out moving average process along time axis to the averaged accumulated phase rotation information provided by said intra-symbol averaging means,

a division means for dividing moving averaged accumulated phase rotation information provided by said time-oriented moving average means by a difference between the number of OFDM symbols used for the accumulation and the number of delayed OFDM symbols caused by the moving average process along time axis so that phase rotation caused by residual carrier frequency error for one OFDM symbol is obtained, and

a delay compensation means for compensating phase error of the phase rotation information provide by said time-oriented moving average means caused by the moving average process along time axis according to the information of phase rotation per one OFDM symbol caused by residual carrier frequency error provided by said division means.

Claim 39 (currently amended): An OFDM packet communication receiver according to claim 34 ~~or 38~~, wherein

said division means comprises a bit shift means for carrying out division process by bit shift operation of N bits when a divisor can be expressed by 2 (N is a natural integer).

Claim 40 (previously presented): An OFDM packet communication receiver according to claim 18, wherein said common phase rotation detection means comprises:

an intra-symbol averaging means for carrying out averaging process to the weighted phase rotation information per one OFDM symbol provided by said weighting means,

a unit amount calculation means for calculating phase rotation of the coherently detected signals for one OFDM symbol caused by residual carrier frequency error according to the averaged accumulated phase rotation information provided by said intra-symbol averaging means,

a phase rotation estimation means for estimating phase rotation provided by said coherent detection means caused by residual carrier frequency error according to the phase rotation information for one OFDM symbol caused by residual carrier frequency error provided by said unit amount calculation means.

Claim 41 (previously presented): An OFDM packet communication receiver according to claim 40, further comprising:

a weight coefficient calculation means for calculating weight coefficient corresponding to the signal quality of each subcarrier signal according to channel estimation result provided by said channel estimation means, so that said weighting means weights phase rotation information provided by said phase rotation information extraction means according to the signal quality supplied by said weight coefficient calculation means.

Claim 42 (previously presented): An OFDM packet communication receiver according to claim 40 or 41, wherein

when the signal provided by said weighting means is vector signal,

said intra-symbol averaging means comprises an intra-symbol vector sum calculation means for carrying out averaging process to the phase component of said vector signal by summing the vector signals provided by said weighting means within one OFDM symbol, and a vector phase detection means for detecting phase of said vector sum provided by said intra-symbol vector sum calculation means.

Claim 43 (previously presented): An OFDM packet communication receive system according to claim 33, further comprising:

a delay compensation circuit for compensating phase error due to process delay in time-oriented moving average included in accumulated phase rotation which is subject to moving average according to an output of said division circuit providing a phase rotation per one OFDM symbol caused by a residual carrier frequency error of an output of said division means, and

an addition means for adding accumulated phase rotation of an output of said delay circuit, and phase rotation due to clock frequency error of an output of said phase rotation estimation means,

wherein said phase rotation compensation means compensates phase rotation caused by clock frequency error and residual carrier frequency error according to an output of said addition means.

Claim 44 (previously presented): An OFDM packet communication receiver according to claim 26 or 27, wherein said first common phase rotation detection means comprises:

an intra-symbol averaging means for carrying out averaging process to said weighted phase rotation information provided by said weighting means within one OFDM symbol,

a unit amount calculation means for calculating phase rotation of the coherently detected signals caused by residual carrier frequency error for one OFDM symbol according to the averaged accumulated phase rotation information provided by said intra-symbol averaging means.

Claim 45 (previously presented): An OFDM packet communication receiver according to claim 26 or 27, wherein said first phase rotation detection means comprises a reverse modulation means for detecting said phase rotation by reverse modulation.

Claim 46 (previously presented): An OFDM packet communication receiver according to claim 26 or 27, wherein said first phase rotation detection means comprises a sign control means for detecting said phase rotation by carrying out sign inversion control according to the result of hard decision provided by said hard decision means (2804).

Claim 47 (previously presented): An OFDM packet communication receive system according to claim 26 or 27, wherein phase rotation of an output of said second phase rotation

detection circuit is weighted by a second weighting means according to weight coefficient of each sub-carrier.

Claim 48 (previously presented): An OFDM packet communication receiver according to claim 47, wherein

a clock frequency error mitigation means is provided for compensating phase error of the phase rotation information provided by said second phase rotation detection means caused by clock frequency error according to the phase rotation information generated by said phase rotation estimation means, and

said second weighting means weights to the phase-compensated phase rotation information provided by said clock frequency error mitigation means.

Claim 49 (previously presented): An OFDM packet communication receiver according to claim 26 or 27, wherein,

when the signal provided by said weighting means is vector signal,

said intra-symbol averaging means comprises an intra-symbol vector sum calculation means for carrying out averaging process to the phase component of said vector signal by summing the vector signals provided by said weighting means within one OFDM symbol, and a vector phase detection means for detecting phase of said vector sum provided by said intra-symbol vector sum calculation means.

Claim 50 (previously presented): An OFDM packet communication receiver according to claim 34, wherein

a delay compensation means for compensating phase error of the phase rotation information provided by said time-oriented moving average means caused by moving average process along time axis according to the information of phase rotation per one OFDM symbol caused by residual carrier frequency error provided by said selection means, and

an addition means for adding delay-compensated accumulated phase rotation information provided by said delay compensation means, and phase rotation compensation means for compensating phase rotation caused by clock frequency error and residual carrier frequency error according to the signals provided by said addition means.

Claim 51 (previously presented): An OFDM packet communication receiver according to claim 26 or 27, wherein said second common phase rotation detection means comprises:

an intra-symbol averaging means for carrying out averaging process to phase rotation information applied to the second common phase rotation detection means within one OFDM symbol,

a delay means for delaying said averaged phase rotation information provided by said intra-symbol averaging means by one OFDM symbol period,

a phase difference calculation means for calculating phase rotation for each OFDM symbol between averaged phase rotation information provided by said intra-symbol averaging means and a delayed phase rotation information provided by said delay means, and

a time-oriented moving average means for carrying out moving average process along time axis to said phase rotation information for each OFDM symbol provided by said phase difference calculation means.

Claim 52 (new): An OFDM packet communication receiver according to claim 13, wherein said residual carrier frequency error estimation means comprises a phase rotation information extraction means for extracting phase rotation information from a part or all of the input signals of said residual carrier frequency error estimation means, and a common phase rotation detection means which detects phase rotation common to all the subcarrier signals caused by residual carrier frequency error according to phase rotation information extracted by said phase rotation information extraction means.

Claim 53 (new): An OFDM packet communication receiver according to claim 52, wherein said phase rotation information extraction means comprises a specific symbol signal extraction means for extracting coherently detected signals in predetermined specific OFDM symbols inputted to said phase rotation information extraction means, a reference signal generating means for generating reference signals corresponding to said coherently detected signals provided by said specific symbol signal extraction means, and a phase rotation detection means for detecting phase rotation of said coherently detected signals provided by said specific symbol signal extraction means according to said reference signals provided by said reference signal generating means.

Claim 54 (new): An OFDM packet communication receiver according to claim 53, wherein said reference signal generating means comprises a hard decision means for carrying out hard decision to the detected signals in the specific OFDM symbols provided by said specific symbol signal extraction means.

Claim 55 (new): An OFDM packet communication receiver according to claim 53, wherein said phase rotation detection means comprises a reverse modulation means for detecting phase rotation by reverse modulation.

Claim 56 (new): An OFDM packet communication receiver according to claim 53, wherein said phase rotation detection means comprises a sign control means for detecting phase rotation by utilizing sign reverse control according to the reference signals provided by said reference signal generating means.

Claim 57 (new): An OFDM packet communication receiver according to claim 52, further comprising:

a weight coefficient calculation means for calculating weight coefficient for each subcarrier signal corresponding to the signal quality information obtained by the result of channel estimation,

a weighting means for weighting phase rotation information provided by said phase rotation information extraction means according to said weight coefficient of each subcarrier signal provided by said weight coefficient calculation means,

and said common phase rotation detection means detects phase rotation common to each subcarrier signal caused by residual carrier frequency error according to phase rotation information supplied by said weighting circuit.

Claim 58 (new): An OFDM packet communication receiver according to claim 52, wherein

a signal quality extraction means is provided for extracting signal quality information of a part or all of subcarrier signals divided by said Fourier transform means,

a signal quality smoothing means is provided for smoothing the signal quality information provided by said signal quality extraction means for each subcarrier along time axis,

said weighting means weights the phase rotation information according to smoothed signal quality information of the coherently detected signals provided by said signal quality smoothing means.

Claim 59 (new): An OFDM packet communication receiver according to claim 58, wherein

said signal quality smoothing means carries out moving average process to signal quality information of coherently detected signals provided by said signal quality extraction means along time axis for each subcarrier.

Claim 60 (new): An OFDM packet communication receive system according to claim 58, wherein

said signal quality smoothing means integrates the signal quality information of the coherently detected signals provided by said signal quality extraction means along the time axis to arrive at an integrated value, and divides said integrated value by the number of signals thus integrated.

Claim 61 (new): An OFDM packet communication receive system according to claim 58, wherein

said signal quality smoothing means integrates the signal quality information of the coherently detected signals provided by said signal quality extraction means along the time axis to arrive at an integrated value, and divides said integrated value by bit shifting of N bits when the number of signals thus integrated can be expressed by 2 (N is a natural integer).

Claim 62 (new): An OFDM packet communication receive system according to claim 57, wherein

a clock frequency error mitigation means is provided for reducing phase rotation of the phase rotation information provided by said phase rotation information extraction means caused by clock frequency error according to of the phase rotation information provided by said phase rotation estimation means, and

said weighting means weights the phase rotation information provided by said clock frequency error mitigation means.

Claim 63 (new): An OFDM packet communication receive system according to claim 58, wherein

a clock frequency error mitigation means is provided for reducing phase rotation of the phase rotation information provided by said phase rotation information extraction means caused by clock frequency error according to of the phase rotation information provided by said phase rotation estimation means, and

said weighting means weights the phase rotation information provided by said clock frequency error mitigation means.

Claim 64 (new): An OFDM packet communication receiver according to claim 52, wherein said common phase rotation detection means comprises:

an intra-symbol averaging means for carrying out averaging process to the phase rotation information within one OFDM symbol provided by the phase rotation detection means,

a phase rotation accumulation means for calculating accumulated phase rotation from that time on the channel estimation according to the averaged phase rotation information provided by said intra-symbol averaging means,

a moving average means for carrying out moving average process along time axis to the accumulated phase rotation information provided by said phase rotation accumulation means, and

a division means for dividing moving averaged accumulated phase rotation provided by said moving average means by a difference between the number of OFDM symbols used for the accumulation and the number of delayed OFDM symbols caused by moving average process so that phase rotation caused by residual carrier frequency error for one OFDM symbol is obtained.

Claim 65 (new): An OFDM packet communication receiver according to claim 64, wherein said phase rotation accumulation means comprises:

a delay means for delaying the averaged phase rotation information within one OFDM symbol by one OFDM symbol period,

a phase difference calculation means for calculating difference between the averaged phase rotation information provided by said intra-symbol averaging means and the delayed phase rotation information provided by said delay means so that phase rotation for each OFDM symbol is obtained, and

an integration means for integrating the phase rotation information provided by said phase difference calculation means.

Claim 66 (new): An OFDM packet communication receiver according to claim 52, wherein said common phase rotation detection means comprises:

an intra-symbol averaging means for averaging phase rotation information applied to said common phase rotation detection means within one OFDM symbol,

a delay means for delaying the averaged phase rotation information provided by said intra-symbol averaging means by one OFDM symbol period,

a phase difference calculation means for calculating the difference between the averaged phase rotation information provided by said intra-symbol averaging means and the delayed phase rotation information provided by said delay means so that phase rotation for each OFDM symbol is obtained, and

a time-oriented moving average means for carrying out moving average process along the time axis to the phase rotation information provided by said phase difference calculation means.

Claim 67 (new): An OFDM packet communication receiver according to claim 64, wherein

said division means comprises a bit shift means for carrying out the division process by bit shift operation of N bits when a divisor can be expressed by 2 (N is a natural integer).

Claim 68 (new): An OFDM packet communication receive system according to claim 52, further comprising:

a delay compensation circuit for compensating phase error due to process delay in time-oriented moving average included in accumulated phase rotation which is subject to moving average according to an output of said division circuit providing a phase rotation per one OFDM symbol caused by a residual carrier frequency error of an output of said division means, and

an addition means for adding accumulated phase rotation of an output of said delay circuit, and phase rotation due to clock frequency error of an output of said phase rotation estimation means,

wherein said phase rotation compensation means compensates phase rotation caused by clock frequency error and residual carrier frequency error according to an output of said addition means.

Claim 69 (new): An OFDM packet communication receiver according to claim 52, wherein said phase rotation information extraction means comprises a pilot signal extraction means for extracting pilot signals from the coherently detected signals inputted to said phase rotation information extraction means, a reference signal generating means for generating reference signals corresponding to the pilot signals, and a phase rotation detection means for detecting phase rotation of the extracted pilot signals according to the reference signals.

Claim 70 (new): An OFDM packet communication receiver according to claim 69, wherein said phase rotation detection means comprises a reverse modulation means for detecting phase rotation by reverse modulation.

Claim 71 (new): An OFDM packet communication receiver according to claim 21, wherein said phase rotation detection means comprises a reverse modulation means for detecting phase rotation by reverse modulation.

Claim 72 (new): An OFDM packet communication receiver according to claim 53, wherein said phase rotation detection means comprises a reverse modulation means for detecting phase rotation by reverse modulation.

Claim 73 (new): An OFDM packet communication receiver according to claim 69, wherein said phase rotation detection means comprises a sign control means for detecting phase rotation by utilizing sign reverse control according to the reference signals provided by said reference signal generating means.

Claim 74 (new): An OFDM packet communication receiver according to claim 21, wherein said phase rotation detection means comprises a sign control means for detecting phase rotation by utilizing sign reverse control according to the reference signals provided by said reference signal generating means.

Claim 75 (new): An OFDM packet communication receiver according to claim 53, wherein said phase rotation detection means comprises a sign control means for detecting phase

rotation by utilizing sign reverse control according to the reference signals provided by said reference signal generating means.

Claim 76 (new): An OFDM packet communication receiver according to claim 20, said common phase rotation detection means comprises:

an intra-symbol averaging means for carrying out averaging process to the phase rotation information within one OFDM symbol provided by the phase rotation detection means,

a phase rotation accumulation means for calculating accumulated phase rotation from that time on the channel estimation according to the averaged phase rotation information provided by said intra-symbol averaging means,

a moving average means for carrying out moving average process along time axis to the accumulated phase rotation information provided by said phase rotation accumulation means, and

a division means for dividing moving averaged accumulated phase rotation provided by said moving average means by a difference between the number of OFDM symbols used for the accumulation and the number of delayed OFDM symbols caused by moving average process so that phase rotation caused by residual carrier frequency error for one OFDM symbol is obtained.

Claim 77 (new): An OFDM packet communication receiver according to claim 76, wherein said phase rotation accumulation means comprises:

a delay means for delaying the averaged phase rotation information within one OFDM symbol by one OFDM symbol period,

a phase difference calculation means for calculating difference between the averaged phase rotation information provided by said intra-symbol averaging means and the delayed phase rotation information provided by said delay means so that phase rotation for each OFDM symbol is obtained, and

an integration means for integrating the phase rotation information provided by said phase difference calculation means.

Claim 78 (new): An OFDM packet communication receiver according to claim 76, wherein

said division means comprises a bit shift means for carrying out the division process by bit shift operation of N bits when a divisor can be expressed by 2 (N is a natural integer).

Claim 79 (new): An OFDM packet communication receiver according to claim 34, wherein

said division means comprises a bit shift means for carrying out the division process by bit shift operation of N bits when a divisor can be expressed by 2 (N is a natural integer).

Claim 80 (new): An OFDM packet communication receiver according to claim 34, wherein

said division means comprises a bit shift means for carrying out division process by bit shift operation of N bits when a divisor can be expressed by 2 (N is a natural integer).

Claim 81 (new): An OFDM packet communication receive system according to claim 20, further comprising:

a delay compensation circuit for compensating phase error due to process delay in time-oriented moving average included in accumulated phase rotation which is subject to moving average according to an output of said division circuit providing a phase rotation per one OFDM symbol caused by a residual carrier frequency error of an output of said division means, and

an addition means for adding accumulated phase rotation of an output of said delay circuit, and phase rotation due to clock frequency error of an output of said phase rotation estimation means,

wherein said phase rotation compensation means compensates phase rotation caused by clock frequency error and residual carrier frequency error according to an output of said addition means.

Claim 82 (new): An OFDM packet communication receiver according to claim 28, wherein

said signal quality smoothing means carries out moving average process to signal quality information of coherently detected signals provided by said signal quality extraction means along time axis for each subcarrier.

Claim 83 (new): An OFDM packet communication receive system according to claim 28, wherein

said signal quality smoothing means integrates the signal quality information of the coherently detected signals provided by said signal quality extraction means along the time axis to arrive at an integrated value, and divides said integrated value by the number of signals thus integrated.

Claim 84 (new): An OFDM packet communication receive system according to claim 28, wherein

said signal quality smoothing means integrates the signal quality information of the coherently detected signals provided by said signal quality extraction means along the time axis to arrive at an integrated value, and divides said integrated value by bit shifting of N bits when the number of signals thus integrated can be expressed by 2 (N is a natural integer).

Claim 85 (new): An OFDM packet communication receiver according to claim 57, wherein

a signal quality extraction means is provided for extracting signal quality information of a part or all of subcarrier signals divided by said Fourier transform means,

a signal quality smoothing means is provided for smoothing the signal quality information provided by said signal quality extraction means for each subcarrier along time axis,

said weighting means weights the phase rotation information according to smoothed signal quality information of the coherently detected signals provided by said signal quality smoothing means.

Claim 86 (new): An OFDM packet communication receiver according to claim 85, wherein

said signal quality smoothing means carries out moving average process to signal quality information of coherently detected signals provided by said signal quality extraction means along time axis for each subcarrier.

Claim 87 (new): An OFDM packet communication receive system according to claim 85, wherein

said signal quality smoothing means integrates the signal quality information of the coherently detected signals provided by said signal quality extraction means along the time axis to arrive at an integrated value, and divides said integrated value by the number of signals thus integrated.

Claim 88 (new): An OFDM packet communication receive system according to claim 85, wherein

said signal quality smoothing means integrates the signal quality information of the coherently detected signals provided by said signal quality extraction means along the time axis

to arrive at an integrated value, and divides said integrated value by bit shifting of N bits when the number of signals thus integrated can be expressed by 2 (N is a natural integer).

Claim 89 (new): An OFDM packet communication receive system according to claim 85, wherein

a clock frequency error mitigation means is provided for reducing phase rotation of the phase rotation information provided by said phase rotation information extraction means caused by clock frequency error according to of the phase rotation information provided by said phase rotation estimation means, and

said weighting means weights the phase rotation information provided by said clock frequency error mitigation means.

Claim 90 (new): An OFDM packet communication receiver according to claim 27, wherein said second common phase rotation detection means comprises:

an intra-symbol averaging means for carrying out averaging process within one OFDM symbol to the phase rotation information provided by said second phase rotation detection means,

a phase rotation accumulation means for calculating accumulated phase rotation from that time on the channel estimation according to the phase rotation information provided by said intra-symbol averaging means,

a time-oriented moving average means for carrying out moving average process along time axis to the accumulated phase rotation information provided by said phase rotation accumulation means, and

a division means for dividing moving averaged accumulated phase rotation provided by said time-oriented moving average means by a difference between the number of OFDM symbols used for the accumulation and the number of delayed OFDM symbols caused by the moving average process so that phase rotation caused by residual carrier frequency error for one OFDM symbol is obtained.

Claim 91 (previously presented): An OFDM packet communication receiver according to claim 90, wherein said phase rotation accumulation means comprises:

a delay means for delaying the averaged phase rotation information within one OFDM symbol by one OFDM symbol period,

a phase difference calculation means for calculating difference between the averaged phase rotation information provided by said intra-symbol averaging means and the delayed phase rotation information provided by said delay means so that phase rotation for each OFDM symbol is obtained, and

an integration means for integrating the phase rotation information provided by said phase difference calculation means.